

His account of the Lichens is not more trustworthy than that which he gives of Volvox. He appears to be halting between two opinions with regard to the burning question of the nature of these organisms, for although he states on p. 69 that the germinating spore gives rise to both gonidia and hyphæ, thereby implying that those cells of the thallus which do not contain chlorophyll and those which do have a common origin, yet he admits (p. 74) that the gonidia may escape from the thallus and lead an independent existence, and further (p. 84), that he has observed the formation of a lichen-thallus by the combination of algal and fungal forms which were originally distinct.

His treatment of the Cormophytes is also disappointing. If the student, anxious to become acquainted with the most recent views as to such important points as the gymnosperms of the Conifers and the morphological significance of the embryo-sac and its contents in Flowering Plants, turns to the sections of this book which profess to treat of them, he will find only a few dogmatic statements with regard to the former point, and none at all with regard to the latter. Perhaps these points may have been thought too recondite for discussion in a work which professes to be a handbook for learners of the science, but many pages are devoted to the consideration of subjects, such as the more complicated forms of phyllotaxis, which have principally a mathematical interest. Again, the morphology of the stem, of the leaf, and especially of the root, is dismissed far too summarily. It is to be hoped that these organs, as well as inflorescences, flowers, and fruits, will have justice done to them in the volume on the Classification of Flowering Plants. One further shortcoming must yet be mentioned, namely, the scantiness of the account given of the embryology of plants. This is a subject which has been much studied in recent years, and, from the title of this book, it might naturally be expected that it would give a satisfactory account of the results which have been attained. This is, unfortunately, by no means the case. Some of the facts are mentioned, it is true, but they are stated too briefly to be very intelligible, and no attempt seems to have been made to connect them together and to explain their significance.

It must be admitted that the book contains a considerable amount of information scattered through its pages, but the purely theoretical principles upon which this information has been arranged render it difficult of acquirement, and for this reason, if for no other, the book is not one which can be recommended for the use of students.

OUR BOOK SHELF

The Gardens of the Sun; or, A Naturalist's Journal on the Mountains and in the Forests and Swamps of Borneo and the Sulu Archipelago. By F. W. Burbidge. (London: John Murray, 1880.)

THIS book is the itinerary of a competent and enthusiastic botanist, whose main object was "the collection and introduction of beautiful new plants to the Veitchian collection at Chelsea," in which he so far succeeded as to add about fifty ferns to the list of those already collected in Borneo, about twenty being also new to science, and to introduce alive the giant pitcher-plant of Kina Balu (*Nepenthes Rajah*, Hook. f.). But these alone by no

means show the floral riches which have induced the author to use the by no means exaggerated term "Gardens of the Sun." Amongst epiphytall orchids which here growing in mid-air "screened from the sun by a leafy canopy, deluged with rains for half the year or more at least, and fanned by the cool sea-breezes or monsoons," is found the beautiful *Phalanopsis grandiflora*; nor in the mountain vegetation are like floral riches absent; at 5000 feet the curious pitcher-plant, *Nepenthes Lowi*, was found epiphytall on mossy trunks and branches, and higher still a "large-flowered rhododendron, bearing rich orange flowers two inches in diameter, and twenty flowers in a cluster." The forests and gardens of Borneo are equally rich in native and naturalised kinds of edible fruits, the mango, pine-apple, durian, rambutan, &c., being all alike plentiful and luxuriant, and, as Mr. Burbidge remarks, in some favoured districts in Malaya the forests almost become orchards on a large scale, so plentifully are they stocked.

Zoology was naturally less followed than botany, but still a collection of birds was made, notices of which, contributed by Mr. Sharpe to the Zoological Society, are appended to the volume. We however regret to find the word "alligator" still constantly occurring, whilst the word "boa" is equally misleading. Crocodile and python are words which do not seem to find a home in the East, nor moreover in many books of Eastern travel. It is also quite erroneous to say that Borneo "is the only habitat of the wild elephant in the Malay Archipelago"; certainly so, at least, if we are not to exclude Sumatra from that region.

Many ethnological facts are scattered about the volume; the account of the Jakuns of Johore is taken and fully acknowledged from Maclay's memoir on the subject in the "Journal of Eastern Asia"; but the author contributes an interesting account of the method pursued by the Kadyans in playing the game of football. No one but the student of games knows how difficult it is to find much or any information on this point in most books of travel.

Tasmanian Friends and Foes: Feathered, Furred, and Finned. By Louisa Anne Meredith, Author of "My Home in Tasmania," &c. With Coloured Plates from Drawings by the Author, and other Illustrations. (London: Marcus Ward and Co., 1880.)

IT will probably be granted that there is developed in most people a fondness for certain of what we are pleased to call the lower forms of animals. Such are made pets of for various reasons: the sweetness of their song, the brightness of their plumage, the splendour of their scales—these phenomena act as causes that attract the senses. Their sometimes fond and gentle ways make of some, prime favourites, while a sense of their usefulness makes again of others indispensable companions to man.

Most of man's dumb companions have been taken from groups of animals with a more or less world-wide distribution; and it will no doubt be new to some of our readers to learn that in Australia—a country where the aborigines, for want of native pets, had to import at some time or another a dog—that there, such forms as brush kangaroos, wombats, bandicoots, and even great forest kangaroos—animals only known in these parts—can also become nice, quite gentle, mannerly things, doing a little damage now and then, it is true, by leaving long dirty tracks to bother the housemaid, like a boy home at Christmas time, or pulling up tulip-bulbs, or, worst of all, getting into the children's beds because they are comfortable. The beautifully got-up volume whose title heads this notice is written by a well-known and respected lady who has often before written pleasantly about her Tasmanian home and the bush friends she found or made there. In the present volume she writes an able defence of some of her dumb "marsupial" acquaintances, showing that

they too have intelligence, and that they exhibit at times a very respectable amount of common sense. The stories about them are strictly true, and from their very nature strictly new. But the volume tells also of many a two-footed friend, and the last few chapters almost exclusively treat of the fishes of the coast. There is much in this portion of the volume of interest to the scientific worker; there is much in every part of it to make it of value to those who care to learn something of the habits of Tasmanian beasts, birds, and fishes. One feature of the volume must be specially noticed—the eight coloured drawings, excellently chromolithographed from the water-colour drawings of the author. From a personal knowledge of the splendid colouring often present in freshly-caught tropical fishes, these plates are, we should say, by no means too brilliant. Four are devoted to some of the strange, wondrously-coloured fishes, and four to flowers, fruits, and insects.

This volume would be an excellent and not over-expensive Christmas present, which may lie on any table however select, and be read by any person however critical.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Mr. Spencer and Prof. Tait

PROF. TAIT's explanation itself shows that the word commonly applied to products of imagination, was applicable to his statements; for the only justification he assigns is that he "assumed," that is to say, imagined, that his substitution of "definition" for "formula" must have been the ground of offence. How inadequate a plea this is, will be seen on re-reading the questions I put, which were these:—

"He [Prof. Tait] says that because he has used the word 'definition' instead of 'formula,' he has incurred my 'sore displeasure and grave censure.' In what place have I expressed or implied displeasure or censure in relation to this substitution of terms? Allying that I have an obvious motive for calling it a 'formula,' he says I am 'indignant at its being called a definition.' I wish to see the words in which I have expressed my indignation; and shall be glad if Prof. Tait will quote them. He says:—"It seems I should have called him the discoverer of the formula!" instead of 'the inventor of the definition.' Will he oblige me by pointing out where I have used either the one phrase or the other?"

Every reader would infer that, for these specific statements made by Prof. Tait, there are specific foundations, which could be named when asked for. He does not name them, for the sufficient reason that they do not exist. Unable, as he says, to see in the passages I quoted from him, anything else to call for "censure" (a strange inability!), he "of course" assumed that this change of terms was the ground of censure. And the assumption thus made, is the only warrant he assigns for these positive assertions.

This is not all, however. Prof. Tait says:—"I could not have ventured to suppose that Mr. Spencer 'did not even know that he was in the habit of saying formula rather than definition.' This naive confession cannot but be correct." Of Prof. Tait's motive for putting this statement of mine in italics and calling it naive, the reader may judge for himself. How entirely correct it is, and how well Prof. Tait might have "ventured to suppose" it, will quickly appear. For there is proof that I am not in the habit of always saying formula rather than definition; and Prof. Tait had the proof before him. In the note on page 565 of the Appendix forming the pamphlet in question—a page which Prof. Tait must have read, since it concerns Mr. Kirkman and himself—I have used the word "definition." So that not only had Prof. Tait no evidence on which to base his distinct statements,

but there was under his eyes positive evidence which negated them.

Very possibly it will be said that the question about my uses of these words is a trivial one. But this is not the question. The question is whether it is allowable to make an opponent look absurd by ascribing to him, in a quite positive way, things which he has neither said nor implied; and that, too, when he has implied the contrary. HERBERT SPENCER

Criterion of Reality

WILL you kindly allow a learner to ask for the criterion according to which Kinetic Energy and Work are real things, while Momentum and Force are unreal? Prof. Tait says $\frac{1}{2}mv^2$ and wh express real things, but mv and wt unrealities (NATURE, vol. xxiii. p. 82).

If wt be "as unreal as is the product of a quart into an acre," how is it that wh is real? The illustration of quart and acre is as applicable or inapplicable to the one as to the other. In both cases we take the product of two numbers, not two concrete magnitudes, which of course it would be absurd to speak of multiplying together. In one case the product is the number of units of Momentum, in the other case it is the number of units of Kinetic Energy. If it be said that a thing is real if its quantity cannot be altered, and *vice versa*, why is mv^2 said to be real, and mv unreal? They vanish together. When Prof. Tait asserts "there is no such thing as Force," "it is merely a convenient expression for a certain rate" (NATURE, vol. xiv. p. 459), he seems, if I may venture to say so, to confound the measure of Force with Force itself, and to lay himself open to Mr. Spencer's comment that "a relation changes the state of a body." Certainly mv is not a thing, but neither is mv^2 a thing: yet the latter is the measure of something which Prof. Tait asserts to be "as real as matter itself": why is not that of which the former is the measure equally real? E. G. Bardsea

[What Prof. Tait asserts may be correct or not, but it is self-consistent. He asserts in his lecture on "Force" (NATURE, vol. xiv. p. 462) that matter and energy must be looked on as real things, because we cannot change the amount of either. Such expressions as $\frac{1}{2}mv^2$, and wh , are to be considered as wholes, not as products of two or more factors. This separation into factors (where one is mv , or w , for instance) he asserts to be a relic of the old erroneous belief in the trustworthiness of the impressions made on the "muscular" sense.—Ed.]

Landslips

IN NATURE, vol. xxii. p. 560, I pointed out that landslips often occurred in the Salt Districts. I did not then expect that I should so soon be able to refer again to the subject; but on December 6, at an early hour in the morning, one of the largest subsidences and landslips ever known in Cheshire occurred. I pointed out that whenever fresh water reaches the rock salt it dissolves it. In certain districts in the immediate neighbourhood of Northwich the ground is completely honeycombed with rock-salt mines that had been worked out and abandoned. Into many of these fresh water had penetrated, and had become by solution strong brine. This brine has of late been extensively pumped up, and many of these extensive cavities had become nearly empty. The thin crust of rock salt forming the roof of these old mines had become gradually thinner, owing to its solution by water, and on Monday morning the roof of one pit gave way, and let the superincumbent earth down into the mine, rifling and opening the ground to the surface. The surface rift passed across the bed of a large brook, and the water of the brook ran through the crevice into the mines below. In a short time the water made a more extensive cavity, and as the brook was cut in two about 200 yards above its entrance into a large lake that was drained by the Weaver River, the water in the lower portion of the brook and of the lake, as well as of the Weaver, commenced to return and run down the enlarged cavity. For four or five hours this return stream increased in velocity, pouring down the crater-like hole. Notwithstanding the water of the brook and the return water, as well as a large body of water from another small lake entering this cavity, the water standing in the funnel-shaped hole gradually lowered. The velocity of both portions of the brook increased, and such was the force of the water that the bottom of the brook for 100 yards was scooped out from 2 feet in depth to 10 feet, and the banks were washed away,